

Docket No. 180577-00160

IN THE CLAIMS:

1. (previously presented) A continuous flow reactor for conducting chemical reactions of one or more chemical reactants having an exothermic heat of reaction comprising:
  - a reactor shell having an inlet end tube sheet and an outlet end tube sheet;
  - the reactor shell having an internal reaction zone between said inlet and outlet end tube sheets;
  - at least one thermally conductive principal heat pipe extending between said inlet end and outlet end tube sheets and at least one end of said principal heat pipe extending through one of said tube sheets in fluid sealed manner to a position outside the reaction zone;
  - said reactor having a reactant inlet for introducing reactants to said reaction zone and a product outlet for conducting reaction products from said reaction zone;
  - a plurality of thermally conductive extended heat transfer surfaces comprising a plurality of sealed secondary heat pipes mounted in conducting manner on the exterior surface of said principal heat pipe and extending into said reaction zone for receiving the heat of reaction from said reactants and conveying it to said at least one principal heat pipe;
  - said extended heat transfer surfaces defining therebetween channels for the flow said chemical reactants through said reaction zone; and
  - said at least one principal heat pipe having an evaporation section within the reaction zone and containing a liquid heat transfer fluid for absorbing the heat of reaction from said reactants by evaporating at substantially isothermal conditions to form a vaporized heat transfer fluid which is conveyed from said reaction zone.
2. (previously presented) The continuous flow reactor of Claim 1, wherein the principal heat pipe is a sealed heat pipe and the end of said principal heat pipe which extends

Docket No. 180577-00160

through the tube sheet is a condenser adapted to absorb the heat of reaction from said vaporized heat transfer fluid.

3. (previously presented) The continuous flow reactor of Claim 1, wherein said at least one principal heat pipe is a thermosyphon heat pipe and said principal heat pipe has a first end which extends in fluid sealed manner through said outlet end tube sheet and said principal heat pipe has a second end which extends in fluid sealed manner through said inlet end tube sheet, said heat pipe having a first end in fluid communication with a heat exchanger for conveying said vaporized heat transfer fluid to said heat exchanger and said principal heat pipe having a second end in fluid communication with said heat exchanger for conveying condensed heat transfer fluid to said principal heat pipe.

4. (previously presented) The continuous flow reactor of Claim 1, wherein said at least one principal heat pipe is in fluid communication with a heat transfer device which is external to said reaction zone for removal of the heat of reaction from said continuous flow reactor, said thermally conductive extended heat transfer surfaces are fins and said plurality of sealed secondary heat pipes are in thermally conductive contact therewith, said secondary heat pipes having a first closed end adjacent to said principal heat pipe and in thermal communication therewith and extending from said principal heat pipe to a second closed end which is remote from said principal heat pipe, and said secondary heat pipes containing a liquid heat transfer fluid for absorbing the heat of reaction from said reactants by evaporating at substantially isothermal conditions to form a vaporized heat transfer fluid which can convey the absorbed heat of reaction to said principal heat pipe.

5. (previously presented) The continuous flow reactor of Claim 2, wherein said thermally conductive extended heat transfer surfaces are fins and said plurality of sealed

Docket No. 180577-00160

secondary heat pipes are in thermally conductive contact therewith, said secondary heat pipes having a first closed end adjacent to said principal heat pipe and in thermal communication therewith and extending from said principal heat pipe to a second closed end which is remote from said principal heat pipe, and said secondary heat pipes containing a liquid heat transfer fluid for absorbing the heat of reaction from said reactants by evaporating at substantially isothermal conditions to form a vaporized heat transfer fluid which can convey the absorbed heat of reaction to said principal heat pipe.

6. (previously presented) The continuous flow reactor of Claim 3, wherein said thermally conductive extended heat transfer surfaces are fins and said plurality of sealed secondary heat pipes are in thermally conductive contact therewith, said secondary heat pipes having a first closed end adjacent to said principal heat pipe and in thermal communication therewith and extending from said principal heat pipe to a second closed end which is remote from said principal heat pipe, and said secondary heat pipes containing a liquid heat transfer fluid for absorbing the heat of reaction from said reactants by evaporating at substantially isothermal conditions to form a vaporized heat transfer fluid which can convey the absorbed heat of reaction to said principal heat pipe.

7. (previously presented) The continuous flow reactor of Claim 1, wherein said at least one principal heat pipe is in fluid communication with a heat transfer device which is external to said reaction zone for removal of the heat of reaction from said continuous flow reactor, at least one of said plurality of sealed secondary heat pipes is a sealed flat heat pipe extending from said principal heat pipe into said reaction zone, said flat heat pipe contains a liquid heat transfer fluid for absorbing the heat of reaction from said reactants by evaporating at substantially isothermal conditions to form a vaporized heat transfer fluid which can convey the

Docket No. 180577-00160

absorbed heat of reaction to said principal heat pipe.

8. (previously presented) The continuous flow reactor of Claim 2, wherein at least one of said plurality of sealed secondary heat pipes is a sealed flat heat pipe extending from said principal heat pipe into said reaction zone, said flat heat pipe contains a liquid heat transfer fluid for absorbing the heat of reaction from said reactants by evaporating at substantially isothermal conditions to form a vaporized heat transfer fluid which can convey the absorbed heat of reaction to said principal heat pipe.

9. (previously presented) The continuous flow reactor of Claim 3, wherein at least one of said plurality of sealed second heat pipes is a sealed flat heat pipe extending from said principal heat pipe into said reaction zone, said flat heat pipe contains a liquid heat transfer fluid for absorbing the heat of reaction from said reactants by evaporating at substantially isothermal conditions to form a vaporized heat transfer fluid which can convey the absorbed heat of reaction to said principal heat pipe.

10-18 (Cancelled)